AIR FORCE PROGRAMS:
AN AERIAL TARGETS PERSPECTIVE

2000 NDIA Symposium

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OVERVIEW

- **Background**

- **Modernization Programs**
  - ◆ **Full Scale Aerial Targets**
  - ◆ **Subscale Aerial Targets**
  - ◆ **Scoring**
  - ◆ **Payloads**
  - ◆ **Target Control Systems**

- **New Programs on the Horizon**

BACKGROUND

■ **What Do We Do?**

   ◆ **Develop, Procure and Support Aerial Targets and Their Supporting Systems**

■ **Why Do We Do It?**

   ◆ **To Support DT/OT&E and HQ ACC Weapon System Evaluation Program**

■ **Where Do We Do It?**

   ◆ **Tyndall AFB, FL & Holloman AFB, NM / White Sands Missile Range, NM**

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PROGRAM DESCRIPTION

- ■ **Aerial targets provide realistic threat aircraft representations to evaluate weapon system effectiveness**

- ■ **Provides pilot training in a realistic environment against electronic and infrared countermeasures**

PROGRAM DESCRIPTION

- **Simulates signature characteristics and aerodynamic performance of threat aircraft**

- **Demonstrated worth in DESERT STORM, NORTHERN & SOUTHERN WATCH, Bosnia and Kosovo**
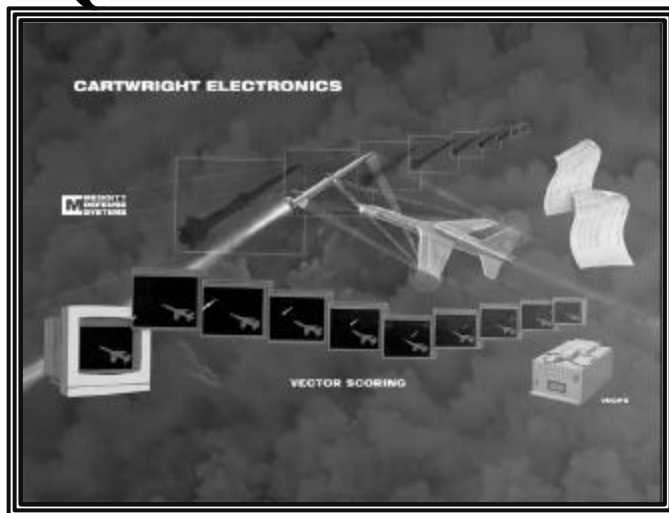
CURRENT PROGRAMS

QF-4

MQM-107

VDOPS

BQM-34

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WHO ARE OUR CUSTOMERS?

AMRAAM

ASRAAM

Special
Programs

AERIAL
TARGETS

F-22

- ## Acquisition Phase :

  - ◆ **Production**

  - ◆ **Sustainment**

- ## Description:

  - ◆ **F-4 converted for joint aerial target use.**

■ **Description:** (cont)

- ◆ **Performance and signature characteristics representative of threat aircraft for weapon system test and evaluation at Air Force and Army /Test Ranges.**

- ◆ **Large payload capacity allows them to carry operational Electronic Countermeasures (ECM) and other unique equipment required for specific tests.**
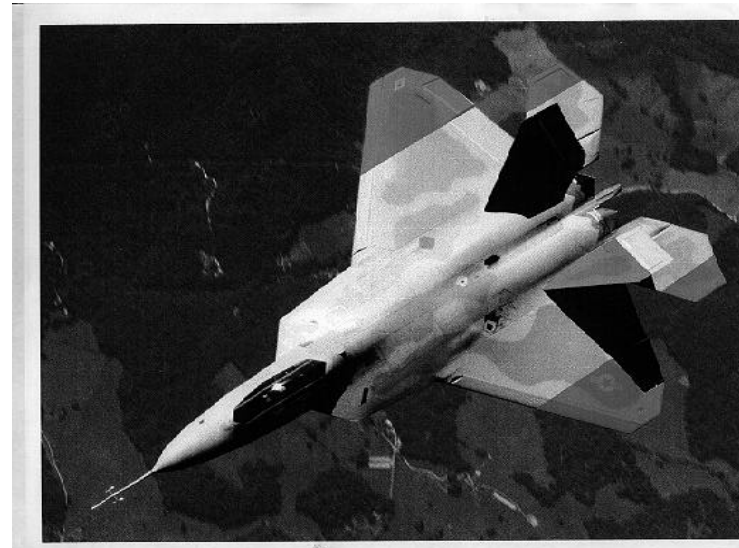
- **Follow-on to QF-4 FSAT**
- **First Tri-Service FSAT**
- **IOC FY 10**

- **Current Air Force Program Status**
  - ◆ **ACC Program Objective Memorandum (POM) Input - FY04**
  - ◆ **CAF-USN-USA 001-93-A ORD Status**
    - ♦ **Provide Target With Realistic Threat Capability Past 2010**
    - ♦ **Preliminary Draft in Requirements Development Team Working Group**
    - ♦ **Projected Start for Official Coordination Cycle ➔ Nov 00**

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■ **Current Air Force Program Status** (cont)

■ **FY01 TMI Candidate**

 ◆ **Airframe Selection**

 ◆ **Update Cost Estimate**

DEVELOPMENT/PRODUCTION MILESTONES

- **FUNDED YRS 1 - 2**
  - ◆ **Requirements Definition**
  - ◆ **Develop Acquisition Strategy**
  - ◆ **Source Selection Process**
- **FUNDED YRS 3 - 6**
  - ◆ **AF lead Joint Service Development**
- **FUNDED YRS 7 and Out - Production Funds**
  - ◆ **AF, Army and Navy Fund for Required Number of Targets**

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■ **Acquisition Phase :**

◆ **Sustainment**

■ **Description:**

■ **Used by the Air Force and the Army for test and training against airborne threats.**

■ **Multiple payload configurations are loaded to provide greater realism for missiles and shooters alike.**

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SSAT - WHERE ARE WE NOW?
MQM-107E

■ **Acquisition Phase :**

  ◆ **Production**

  ◆ **Sustainment**

■ **Description:**

  ◆ **Army-led procurement program; primary mission is an IRCM capability in a high performance environment.**

  ◆ **Simulates high performance aerial threats with high "g" maneuvers and high altitude flight at subsonic speeds.**

SSAT - WHERE ARE WE NOW? BQM-34A

■ **Acquisition Phase :**

- ◆ **Production (-53)**

  ◆ **IOC Mar 01**

- ◆ **Sustainment (-47)**

■ **Description:**

- • **Simulates aerial threats with high "g" maneuvers and high altitude flight at transonic speeds.**

- • **Capability to carry payloads offers the Air Force a realistic target for weapon test and evaluation**

- • **Meets users increased requirements to test in multiple ECM environment.**

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SSAT - WHERE ARE WE GOING?

AIR FORCE SUBSCALE AERIAL TARGET (AFSAT)

- **Multi-Mission Capable Target to Satisfy Infrared and Electronic Countermeasure Missions**

- **Non-Developmental Item (NDI) - 3010 funding**

- **P3I - 3600 funding**

- **IOC - FY 05**

SSAT - WHERE ARE WE GOING?

AIR FORCE SUBSCALE AERIAL TARGET (cont)

■ **CAF(AFMC) 001-93-I-B, OPERATIONAL REQUIREMENTS DOCUMENT (ORD) FOR AIR FORCE SUBSCALE AERIAL TARGET (AFSAT), 25 JAN 2000**

AIR FORCE SUBSCALE AERIAL TARGET

- **Payload   ***
  - ◆ **300 lb external/total store weight   ***
  - ◆ **ECM/IR pods**
  - ◆ **Miniaturized ECM internal carriage (100+ lbs) ***
- **Chaff/flare dispensers**

* Key Performance Parameters (KPPs)

- **Command and Control**
  - ◆ **Air Force Target Control System (TCS) compatible**
  - ◆ **Proportional control**

SSAT - WHERE ARE WE GOING?

- **Flight Performance (with IR/ECM payload)**
  - ◆ **Endurance: 60 min; 30 min at 15,000 ft ***
  - ◆ **Sustained 6g at 10,000 ft**
  - ◆ **Speed range: 250 Kts to .90 Mach ***
  - ◆ **Altitude range: 50 ft to 50,000 ft**
  - ◆ **Threat fighter maneuvers**
  - ◆ **Formations of 2, 3, and 4 targets ***
- *** Key Performance Parameters (KPPs)**

- **Missile Scoring**
  - ◆ **Non-cooperative Vector Scoring compatible with current scoring infrastructure at Tyndall AFB**

Pre-Planned Product Improvement (P^{3}I) CANDIDATES

- **Multi-band conformal antennas**
  - ◆ **Reduce radar cross section and drag, maintain maneuverability**
- **Signature Augmentation**
  - ◆ **Emulate fighter sized target radar signature on airborne intercept and missile tracking radars**

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VECTOR DOPPLER SCORER

- **Acquisition Phase :**

  - ◆ **Production**

  - ◆ **Sustainment**

- **Description:**

  - ◆ **NDI non-cooperative vector missile scoring system to support air-to-air and surface-to air missile testing.**

  - ◆ **Generates 3D missile endgame trajectory data, including position, velocity and attitude.**
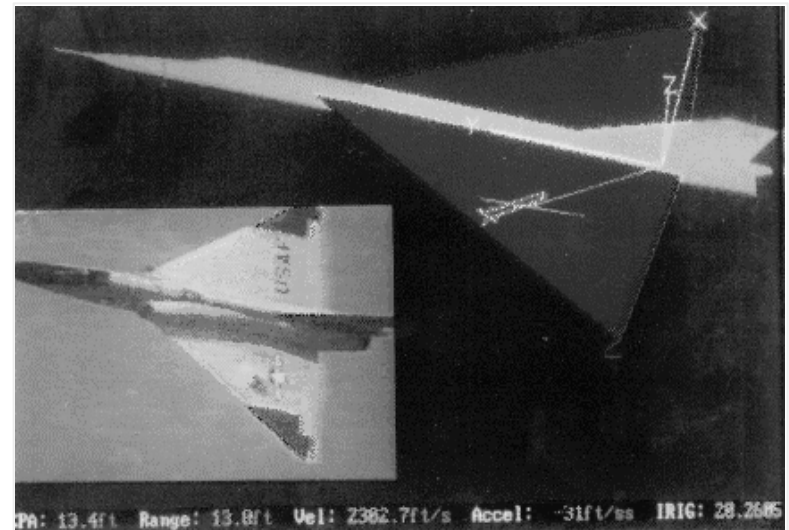
VECTOR DOPPLER SCORER

- ■ **Description**

  - ◆ **The VDOPS is operational on QF-4, BQM-34, and MQM-107D/E aerial targets**

- ■ **Product Improvements**

  - ◆ **Conformal antenna designs on BQM-34 (retrofit and new acquisition)**

  - ◆ **MQM 107 D/E (as required based on mission profile)** 25

VECTOR DOPPLER SCORER

■ **Product Improvements (cont)**

- ◆ **Re-design of sensor (subscale) reduces weight by 1/2 and volume by 2/3**

- ◆ **Modified algorithm to include non-linear trajectory scoring for AIM-9X.**

- ◆ **Integration of GPS receiver into sensor for time-tag information**

VECTOR DOPPLER SCORER

- **QF4 Antenna Optimization project on contract**
  - ◆ **Sub-optimal antenna pattern coverage has caused poor score generation**
  - ◆ **NRE + Prototypes only**
- **Exploring joint development / integration with Navy for QF4 to replace ARMS**
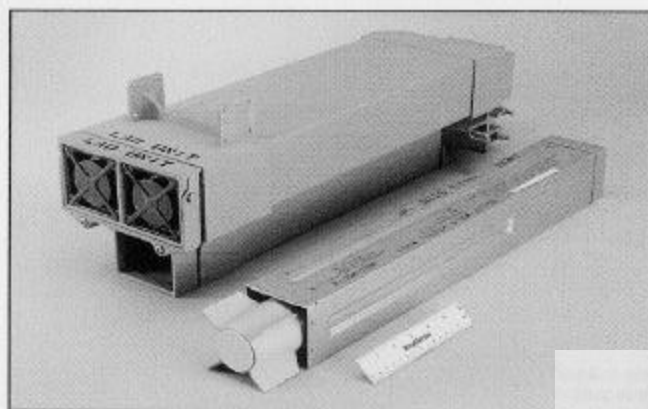
PAYLOADS - WHERE ARE WE NOW?

- **Payloads recently added to Aerial Targets PMD (Countermeasures and Electronic Attack)**

Chaff & Flare Dispensers

ALE-50
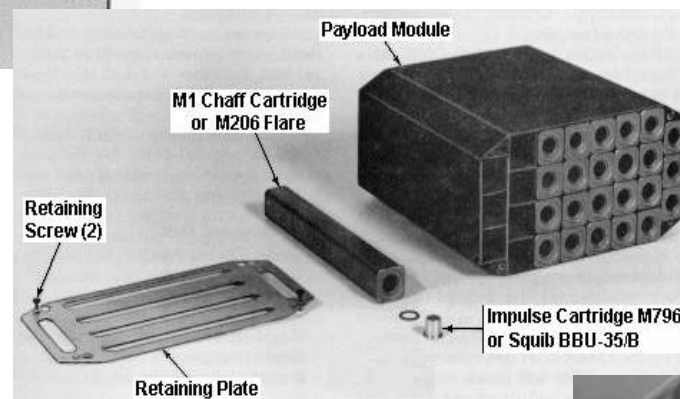
M-130

ALE-10

PAYLOADS - WHERE ARE WE NOW?

Chaff & IR Dispenser

ALE -44

IR

APC-4

ECM
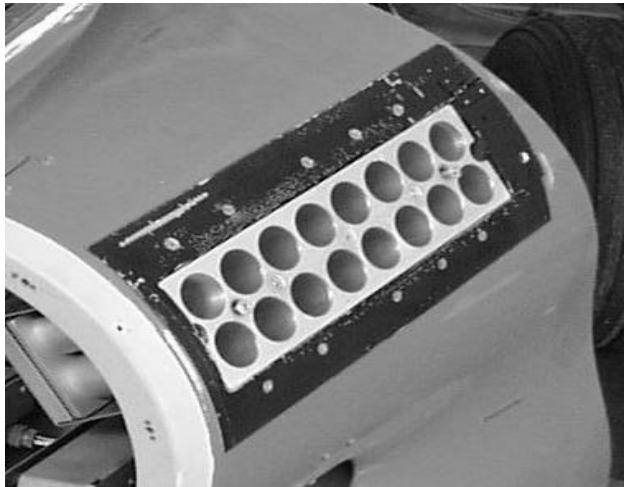
DLQ-9

- **Enhance EW /EA /ECM payloads effectiveness with target maneuverability**
    - ◆ **Integrate current EW/EA/ECM payload LRUs for internal carriage on subscales (BQM-34/107E/AFSAT)**
    - ◆ **Encourage miniaturization of EW/EA/ECM radar into AFSAT production at earliest opportunity**

PAYLOADS - WHERE ARE WE GOING?

- **Other EW/EA/ECM enhancements (Full scale and subscale targets)**
  - **Provide modern EW/EA/ECM capabilities**
  - **Threat-driven analog / digital single processing enhancements**
  - **Non-threat driven analog / digital single processing enhancements**
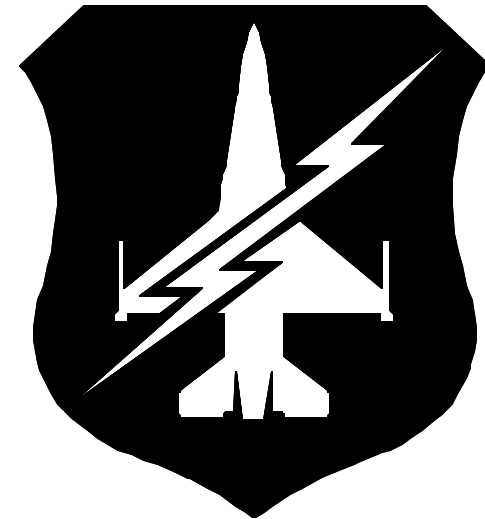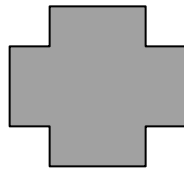
SUMMARY

WHERE IS AERIAL TARGETS GOING?

FSAT

WHERE IS AERIAL TARGETS GOING?

SSAT

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WHERE IS AERIAL TARGETS GOING?

SCORING ENHANCEMENTS

PA: 13.4ft Range: 13.0ft Vel: 2382.7ft/s Accel: -31ft/ss IRIG: 28.2685
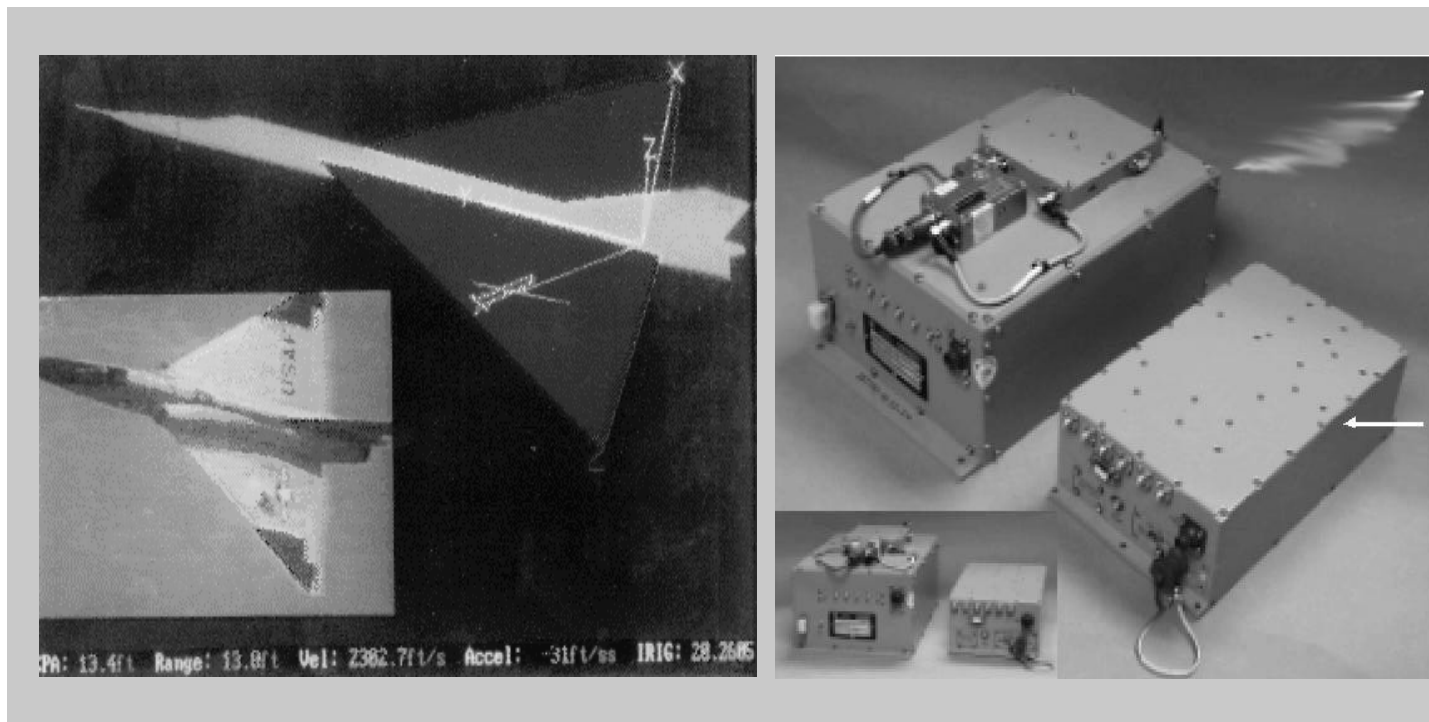
PAYLOADS

MINIATURIZED
PAYLOADS

QF-22

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■ **Air Force Subscale Aerial Target - IOC FY05**

  ◆ **Non-Developmental Item (NDI) Acquisition**

■ **Air Superiority Target - IOC FY10**

  ◆ **Follow-On to the QF-4 FSAT**

  ◆ **First Tri-Service FSAT**

  ◆ **SPO is Working Funding Through OSD for Airframe & Cost Study in FY01**

Future Challenges

- ## The Days of a "Vanilla" Target are Gone

  - ### Advanced aircraft and cruise missile threats
    - Performance
    - IR Signature
    - Radar Cross Section
    - Electronic Countermeasures
    - Chaff & Flares

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